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FACT 4.—The calcium borate ball (2) is now held as a bead *per se* on platinum wire, and 2.5mgrs. of pure silica, or of rock crystal, dried at red heat, dissolved in it B B: after which the silicious ball is weighed, and added B B to a boric acid bead, which it NOW *renders opaque with opalescent matter;* finally, the extracted ball, when weighed, showed, in an average of three assays, an increase in weight of 42 per cent.

FACT 5.—5mgrs. of pure "anhydrous" silica (SiO_2) are carefully taken up on a bead of pure boric acid, and observed to be absolutely unalterable there, B B. A weighed ball of anhydrous calcium-borate is now added B B to this bead, when the silica is gradually decomposed —the weight of the ball being unaltered—not into silicon and oxygen, but into really anhydrous silica (*which possesses extraordinary electrical properties*), and some compound of hydrogen, which makes the bead opalescent. After boiling, only 2mgrs. of residue are obtained.

Now these five facts, and more especially the immense increase in weight of the silicious calcium-borate ball (4), notwithstanding the great loss of matter causing opalescence, show that there is an enormous percentage, nearly half, of SOME COMPOUND OF HYDROGEN, not eliminable as gas, existing in what has been hitherto supposed to be an anhydrous substance, which has escaped even the closeness of modern chemical analysis, for the simple reason that the water solutions of acids and alkalies used to analyse, themselves contain this very compound of hydrogen.

Many confirmatory proofs of this startling truth have been afforded, but cannot be detailed here, because the details form part of the subject of a competitory essay, and cannot yet be published.

Hydrogen, however, in this solid form, can now be proved to be an almost omnipresent component—of all so-called "anhydrous" minerals, of most artificial as well as natural inorganic productions, of many so-called "elements," and, to my mind, of the galvanic "currents" themselves.

Thus it is seen that the beautiful and immaculate theory of combining proportions, first enunciated in 1777 by the illustrious Wenzel in his "Lehre Von der Verwandschaft der Körper," relates entirely to hydrates, and that a new chemistry, the chemistry of anhydrates, now requires to be studied.

Let us hope that some future Wenzel and Dalton will apply proportional and atomic theories to this anhydrate chemistry, and now that the first dawning of the truth has at last been published in Germany and America as well as here, we cannot doubt that this will soon be done.

It remains, now, an unpleasant part of my duty to point out that, although I supposed, by the discovery of the above mentioned facts, I had laid the first foundation of what must, sooner or later, be adopted as a new and essential study by everyone who aspires to the title of a philosophical chemist, I found I had been anticipated in my most important deductions by no less a man than Joseph Priestly.

That unfortunate genius—in repeating one of whose experiments with a more powerful electric battery, Sir Humphry Davy discovered potassium—has been so utterly misrepresented by the modern school of chemists, which has elevated Lavoisier in his place as the founder of the chemistry of hydrates, that it would take more time than you and I can afford, to adduce in proof, a quarter of their misrepresentations.

I will give just one instance. Prof. Cooke, in the book called "The New Chemistry," says (p. 98): "Iron, in rusting, gains in weight, 'Hence,' said Lavoisier, 'it has combined with some material.' 'No,' said such men as Cavendish, Priestley, and Scheele, 'it has only lost phlogiston, which differs from your gross forms of matter in that it is specifically light, and, when taken from a body, increases its weight.' We smile at this idea," etc.

Now what does Priestley himself say?—See p. 249, Vol. I., "Experiments and Observations," sect. IV., "Inflammable Air."—"It was even asserted by some that phlogiston was so far from adding to the weight of bodies, that the addition of it made them really lighter than they were before, on which account they chose to call it the principle of levity!" Priestley says here, that he "discovered phlogiston to be hydrogen by direct experiments."

Then follow those celebrated experiments—so much neglected and concealed by modern chemists—in which Priestley converted a certain quantity of lead oxide into a certain quantity of lead "by throwing the focus of a burning-lens upon it through a glass receiver filled with a certain quantity of "inflammable air"—or hydrogen.

It may be fashionable now to "smile at the ideas of such men as Cavendish, Priestley and Scheele"; but it seems to me much more reasonable to smile at the ideas of Lavoisier and his disciples, who did not seem able to understand the possibility of a compound losing (by means of heat or other factor in the operation) an extremely light constituent, and taking up, instead of it, another surrounding constituent sixteen times as heavy, whereby the aggregate weight of the compound would, of course, be increased by the coefficient fifteen.

In precisely the same way I have proved, by my humble experiments, that a ball of calcium-borate, having silica (for instance) dissolved in it, increases enormously in weight by treatment in boric acid B B, although it obviously loses a large quantity of hydrogenous matter, which renders the whole bead opaque white; simply because the compound acquires, instead, a much heavier constituent—viz., boric acid.

We invite those who are interested in the blow-pipe analysis who desire any information on the subject to address a letter to "SCIENCE," as Col. Ross is one of our subscribers, and appears always ready to aid those who require instruction. A letter to "SCIENCE" will doubtless receive prompt attention.

THE AMERICAN CHEMICAL SOCIETY.

The March meeting of the American Chemical Society was held on Monday evening, the 7th inst., Vice-president Squibb in the chair. The resignations of the following gentlemen were read and accepted. Messrs. Elihu Root, H. G. Smith, F. Alexander, J. T. O'Connor, and also, in consequence of its interference with his business, the Recording Secretary Dr. A. H. Gallatin, tendered his resignation from office. Mr. Theodore Tonnelé and Mr. J. G. Mattison were nominated for membership. The reading of papers followed, the first of which "A New Specific Gravity Bottle" by William H. Gregg, was read by Dr. A. Behr. The essential difference between the ordinary bottle and the one devised by Mr. Gregg consists in that the latter has an expansion or bulb just above where the stopper is, in the regular form. A thermometer serves as a stopper passing through the bulb sealing it at both extremities. The advantage of this improvement is that the liquid cannot run over or volatilize (in the case of essential oils, etc.,) for it will be retained in the bulb which is stoppered at each end by the thermometer.

The second paper was by Dr. J. H. Tucker, "On the solvent action of carbonic anhydride in solution upon various bodies under different conditions as to temperature and pressure." The methods of manipulation were first detailed, after which the effect upon the "various bodies," these being chiefly mineral, was described. Mr. Casamajor followed with some observations upon the difficulty that he had experienced in obtaining hydrogen sulphide from impure iron sulphide. After some experimenting he found that upon adding a little zinc amalgan, alopians evolution of the gas ensued. By this method he was successful in obtaining excellent results with galena, orilcopyrite and pyrite.

Mr. J. H. Stebbins, Jr., called the attention of the society to several new coloring materials that he had discovered among the di-amido compounds. They were yellow in color and suitable for silk, woolen and cotton dyeing, but especially desirable for the latter.

Dr. A. R. Leeds gave a short description of some new experiments on the action of hydrogen peroxide with ammonium hydrate.

A committee consisting of Mr. Casamajor and Dr. Alsberg were appointed to make arrangements for the annual dinner. M. B.

NEW YORK, *March* 9, 1881.

IMPROVED PORTABLE EQUATORIAL STANDS.

By JAMES H. GARDINER.

The stand I use, and those which I have seen, have no levels and no means by which the telescope can be moved in azimuth without moving the whole stand. It seems to me that, with a very little trouble, these stands could be made not only a great deal more accurate, but also much more useful for amateur work by the following additions: Instead of having the equatorial mounting screwed firmly to the lower plate to which the legs are attached so the telescope cannot be moved in azimuth without moving the whole stand, a plate could be ground to touch, say, only ¼ of an inch, and revolved on the lower plate. This would give a steadier and easier motion, with less friction than if the two plates were ground to touch all over. A thread is to be cut in the side of this upper plate, so that with a tangent screw it can be moved in azimuth. On this upper plate that revolves on the lower plate, and to which the tangent screw is attached, should be placed two levels at right angles to each other, and then on this upper plate that revolves the usual equatorial mounting is to be firmly fastened. It will be seen that the above stand only differs from the usual stands on tripods, in having levels and means to move the telescope in azimuth without moving the whole stand. Such a stand would be of great use to amateurs, who have a poor horizon, and are obliged to move their stands about to command all parts of the heavens; or for those who may have a good horizon, but cannot afford the luxury of a fixed pillar and dome. The use of such a stand will appear from the following illustration; Suppose the observer has such a stand, and that he is at Washington, and on the 1st of March, 8 P. M., he desires to put his telescope in the meridian. He carefully levels the stand, and turns his telescope on *a Polaris* to come into the centre of the field. If it does not happen to come exactly in the centre of the field, he can raise or lower his polar axis, or move the telescope in azimuth by aid of the tangent screw. Here it is to be noted that with the old stands he would have to twist the whole stand around and throw it out of level, and by repeated trials get *a Polaris* in the centre of the field, and when he again levelled the stand *a Polaris* might not be in the centre of the field. Thus every movement of the old stand would throw it out of level. All these tedious trials are obviated by the new stand with azimuth motion. When once levelled it would stay so, and the telescope could be moved to the east or west without having to be continually bothered with levelling it. Thus in a few moments he would have *a Polaris* in the centre of the field, and the telescope approximately in the meridian. He now reads his R. A. circle, and turns his telescope on some well known star, as *a Leonis* or *Regulus*, for example, and then reads his R. A. circle again. Supposing the difference of these two readings of the R. A. circle to be 3h. 25m. 13s., this is the observed hour-angle of *Regulus*. The true hour-angle of *Regulus* is equal to the difference of the Sidereal time and the R. A. of *Regulus*, or 3h. 22m. 13s. This shows that the object-end of the telescope must be moved 3m. to the west to make the observed hour-angle agree with the true hour-angle. This can be done nicely by the targent screw that moves the telescope in azimuth without throwing it out of level, but with the old kind of stand it would be thrown out of level, and it would be a very tedious job, requiring time and patience to accomplish. Having got the telescope very nearly in the meridian, the declination circle can now be set to the δ of the star. With such a sand the careful amateur can put it near enough in the meridian to pick up a comet or any other object by its R. A and δ. The accuracy of the adjustments depends upon the levelling, the collimation, and an exact value of the local time. The levelling would generally be accurate enough, and most stands have screws in the saddle that carries the telescope for correcting the collimation. But the amateur should try to get the exact value of his local time, as this would probably introduce the greatest error. This can be done by equal altitudes of the sun or star. Or where the latitude of the place is well known the local time may be found by an altitude of the sun. With such a stand as has been described, if it should be necessary to move it to another place, it could easily be put in the meridian again, as described. Besides, many have stands with good circles which they seldom use, because they cannot afford a fixed pillar and dome, and do not care to put it in the meridian, as they are obliged each night to bring the telescope into the house. But if it could be put in the meridian easily, I am sure many would be pleased to use their circles.

ASTRONOMICAL MEMORANDA.

[Approximately computed for Washington, D. C., Monday, March 21, 1881.]

Sidereal time of mean noon, 23^h, 57^m, 24^s. Equation of time, 7^m, 8^s. Mean noon *preceding* apparent noon.

On the morning of March 20th, the sun crosses the equator and enters the constellation Aries, thus indicating the commencement of Spring. The violent actions upon the sun's surface have continued throughout the past month.

The *moon* reaches its last quarter on March 22, and is new again on the 29th. On March 21st, she crosses the meridian at 4 A. M. The moon will be in conjunction with Mercury on the 27th, and with Jupiter and Saturn on the morning of the 31st.

Mercury is morning star, crossing the meridian about an hour before the sun, nearly 6 degrees farther south. Mercury was in inferior conjunction with the sun on the 11th and is travelling towards the west.

Venus has been moving westward since her greatest eastern elongation on the 20th of February, and will continue to increase in brilliancy till March 27th. She crosses the meridian at about 2.40 P. M., about 20 degrees farther north than the sun.

Mars, crossing the meridian nearly 3 hours in advance of the sun, is coming towards us, and gradually increasing in brilliancy.

Jupiter crosses the meridian at about 1.15 P. M., and *Saturn* 15 minutes later. They are both becoming very unfavorably situated for observation, and must be looked for immediately after sun-set.

Uranus is in right ascension 10^h, 50^m, 47^s; declination 8° 14′ north, and was in opposition on March 1st.

Neptune, right ascension 2^h, 47^m, 17^s; declination 13° 56′ north. Neptune and Venus are in conjunction on the 23rd.

THE following is a list of the officers and council of the Royal Astronomical Society, elected February 11, 1881:—President: J. R. Hind; Vice-Presidents: Prof. Cayley, E. Dunkin, W. Huggins, E. J. Stone; Treasurer: F. Barrow; Secretaries: W. H. M. Christie, J. W. Glaisher; Foreign Secretary: the Earl of Crawford; Council: Prof. Adams,